

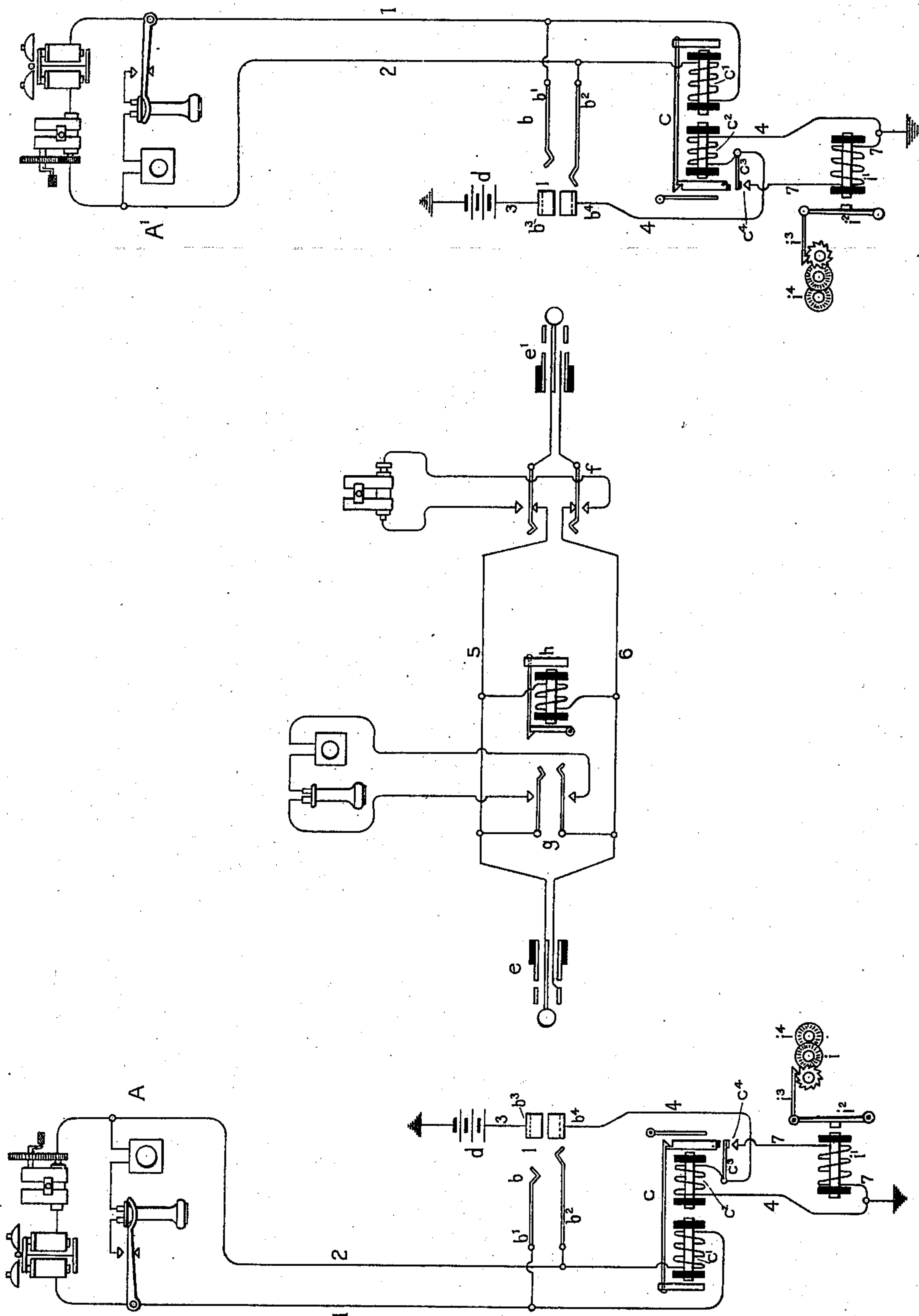
No. 655,164.

Patented July 31, 1900.

C. E. SCRIBNER.
CONNECTION COUNTER FOR TELEPHONE LINES.

(Application filed Nov. 13, 1897.)

(No Model.)



Witnesses:

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UNITED STATES PATENT OFFICE.

CHARLES E. SCRIBNER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE WESTERN ELECTRIC COMPANY, OF SAME PLACE.

CONNECTION-COUNTER FOR TELEPHONE-LINES.

SPECIFICATION forming part of Letters Patent No. 655,164, dated July 31, 1900.

Application filed November 13, 1897. Serial No. 658,390. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. SCRIBNER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Connection-Counters for Telephone-Lines, (Case No. 455,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

This invention concerns the registration of the use of telephone-lines. The appliance is designed to register calls sent in the initiation of connections and receiving response on the part of the operator at the central office and is adapted for use in connection with switchboards of the ordinary type having annunciators and means for restoring the annunciators in the act of answering the calls. In an application of even date herewith I have described and claimed, broadly, a connection-counter designed for this general mode of operation adapted for association with lines arranged for the automatic transmission of signals. The present application relates, therefore, to the use of this type of apparatus in connection with annunciators adapted for momentary operation by call-signals transmitted by special acts of the subscribers.

The invention consists in the combination of the line-annunciator and the local restoring-circuit thereof, with means for closing the local circuit in the act of making connection with the line, of electromagnetically-controlled counting mechanism having its controlling electromagnet in a circuit controlled jointly by special switch-contacts associated with the indicator of the annunciator and by switch-contacts closing the local restoring-circuit of the annunciator, the electromagnet being excited only when both of these devices become operative, whereby the transmission of a call and the operation of the line-annunciator thereby, followed by the establishment of connection with the line in response to the call, causes the act of registration.

The invention is illustrated in the attached drawing, which represent two subscribers' stations connected by lines with the usual

calling and connecting appliances in a telephone-switchboard, each line being provided with a connection-counter. The apparatus at the subscribers' stations A and A' may comprise the usual transmitting and receiving telephone, call-bell, generator of alternating signaling-current, and switch for switching the telephones and the bell alternately into the circuit of the line. The line conductors 1 and 2 therefrom lead to one or more spring-jacks *b* in a telephone-switchboard in the central office and are permanently connected together through the winding of the so-called "line-magnet" *c'* of a line-annunciator *c*. Each of the spring-jacks is provided with the usual line-contacts *b'* *b*² and, in addition to these, with local contacts *b*³ *b*⁴. The local contact *b*³ forms the normally-open terminal of a grounded conductor 3, which includes a battery *d*. The corresponding contact *b*⁴ forms the terminal of a wire 4, leading to earth through the restoring-magnet *c*² of the line-annunciator.

The usual connecting-plugs *e e'* are furnished for the use of the operator in connecting lines together through the medium of their spring-jacks. The plugs form the terminals of a plug-circuit 5 6, which includes a calling key *f* for transmitting calling current through the plug *e'* and which is connected with a listening key *g* for bringing the operator's telephone into the plug-circuit and with a clearing-out annunciator *h* for indicating the signal for disconnection.

Each line is provided with a connection-counter *i* permanently associated with it. The connection-counter comprises a magnet *i'*, an armature and armature-lever *i*² thereof, a pawl *i*³, or other suitable mechanism controlled by the armature, and a train of counting-wheels *i*⁴, actuated by the pawl when the armature is moved. Each line-annunciator has switch-contacts *c*³ *c*⁴, which become closed together through the agency of the shutter *c*⁵ of the annunciator when the latter is released and falls to show a call-signal. These contacts *c*³ and *c*⁴ may occupy the same position and operate in the same way as the night-bell contacts usually provided on such annunciators. The contact-spring *c*³ of this pair is connected with the wire 4 between the

contact-piece b^4 of the spring-jack and the restoring-magnet of the annunciator. The contact c^4 forms the terminal of a grounded wire 7, which includes the magnet i' of the connection-counter.

The counting mechanism should be constructed for exceedingly-rapid operation as respects the time required in the act of restoring the annunciator. This condition may be attained by rendering the response of the restoring-magnet of the annunciator slow by any well-known means or by adapting the counting mechanism for quick response to an exciting-current.

The operation of calling from a substation for a connection and the operator's acts in answering the call are well known, and hence I will pass at once to the description of the mode of operation of this connection-counter. A call from a station—as, for example, from station A—releases the shutter of the annunciator to indicate the signal, and thus brings the contact-pieces $c^3 c^4$ into electrical connection. The insertion of a plug e into the spring-jack b of the calling line in response to this call crosses together the contact-pieces $b^3 b^4$ of the spring-jack through the medium of the insulated sleeve of the plug, completing a circuit from battery d through wires 3, 4, and 7. The current in this circuit excites the magnet i' of the connection-counter and causes this instrument to register one answered call. An instant later, after sufficient time has elapsed for the charging of the restoring-magnet c^2 of the line-annunciator, the shutter c^5 of the annunciator is attracted and the contact-points $c^3 c^4$ become again separated, so that the disconnection of the counter from the line and the restoration of the indicator to its normal position occur simultaneously.

Obviously the act of the subscriber alone in transmitting a call-signal would be ineffective for the registration of the use of the line, inasmuch as no closed circuit including a source of current would be formed through the magnet of the counter. Similarly the establishment of connection with a line over which no call had been sent would not operate the connection-counter, since at the moment of the establishment of the connection the contact-pieces $c^3 c^4$ of the line-annunciator of the corresponding line would be separated. This is the condition as respects all lines to which connection may be made in response to calls from other lines. The act of making connection with such lines locks the line-annunciator in its normal position, and hence prevents the actuation of the connection-counter through currents occurring incidentally in the use of the lines. The registering appliance therefore registers only calls for the initiation of connections which receive response from the attendant at the switchboard and effects this through coöperation of the subscriber and the attendant.

I claim as new and desire to secure by Letters Patent—

1. The combination with a telephone-line, a magnet associated therewith to indicate a call, and means for making connection with the line, of an electrically-controlled connection-registering appliance associated with the line, a local circuit including the magnet thereof, said local circuit being normally broken at two points, switch-contacts controlled by the said call-indicating magnet to close one break in the local circuit, and other switch-contacts adapted to be brought together in the act of making connection with the line to close another break in the local circuit; whereby the registering appliance is actuated when a call is followed by the establishment of connection with the line, as described.

2. The combination with a telephone-line, the line-annunciator thereof, and the spring-jack for making connection with the line, of a connection-counter associated with the line, a local circuit including the controlling-magnet of the connection-counter normally broken at two points, switch-contacts on the line-annunciator adapted to be closed thereby in the display of the signal to close one of the breaks, and switch-contacts in the spring-jack adapted to be connected therein when a plug is inserted in the jack to close the other of said breaks, and a source of current in the local circuit, as described.

3. The combination with a telephone-line and means for causing calling or signaling current to flow in the line, of a line-annunciator associated with the line and responsive to current flowing therein, a terminal spring-jack for the line whereby connection may be made therewith, a connection-register for the line, a circuit controlling or governing the operation of said connection-register, a source of electric current included in said circuit for effecting the operation of the connection-register, and two sets of switch-contacts, one set actuated by the line-annunciator and the other set actuated by connection with the spring-jack, said two sets of switch-contacts acting jointly or coöperating to control the continuity of the said circuit governing the connection-register, whereby said connection-register is operated when connection is made with the spring-jack in response to a call indicated by the line-annunciator, substantially as described.

4. The combination with a telephone-line and means for causing a flow of calling current therein, of an annunciator for the line adapted to respond to the flow of calling current in the line, whereby a signal is displayed, a restoring-winding for the said annunciator adapted when traversed by electric current, to cause the effacement of the line-signal, a local circuit including a source of current and the restoring-winding of the line-annunciator, and switch-contact closed in the act of making connection with the spring-jack of the line for

closing said local circuit, a connection-register for the telephone-line, a branch circuit controlling said connection-register, and a switch-contact governing said branch circuit, 5 actuated by the line-annunciator in displaying its signal, substantially as set forth.

5. The combination with a telephone-line, the line-annunciator thereof, the spring-jack for the line and the local circuit normally open 10 in the spring-jack including a restoring-magnet of the line-annunciator, of an electrically-controlled connection-counter associated with

the line, the magnet thereof being in a normally-open shunt of the restoring-magnet of said line-annunciator, and switch-contacts ac- 15 tuated by the indicator of the annunciator controlling the continuity of said circuit through the magnet of the counter, as described.

In witness whereof I hereunto subscribe my name this 30th day of September, A. D. 1897. 20

CHARLES E. SCRIBNER.

Witnesses:

ELLA EDLER,

JAMES L. MCQUARRIE.